STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : [redacted]

FROM : [redacted]

DATE: 13 May 55 STAT

SUBJECT: Video Strips

1. [redacted] advised this date that SBT type L5100 have been replaced in production with their L5106's. Current price is $7.50 ea. STAT

2. When you get your order number we can pass to local repersentative to expedite delivery if possible. Current time is 30 days, this delay is by reason of prior orders and military prepardness program.

3. Plate size should not exceed 1.5 x 5 inch. (length will permit: (a) cut-off as desired, (b) incorporation (in later units) of audio amplifier or, (c) attachment of an existing hearing aid type amplifier.)

LBR

Att: ckt diagram
extract of SBT paper

SUBJECT: OVERLOAD TEST OF SBT CRYSTAL VIDEO RECEIVER

The letters of reference #1 below points out that conventional microwave video receivers have excessively long recovery time (milliseconds) from overload signals. Many designers (e.g. DCFL) are willing to sacrifice considerable sensitivity to overcome the defect. Reference #2 and #3 shows the feasibility of the development of a microwave video receiver with a 1N263 detector followed by transistor video amplifier of direct coupled SBT's that will have less than one microsecond recovery to overload signals and a senstivity equal or better than the best of conventional video receivers(2 x 10-9 watts or -57 dbm for 1 mc. bandwidth).

The following memorandum discusses an experimental verification of the fast recovery capabilities of a 1N263 - SBT microwave video receiver.

An X-band crystal video receiver composed of a 1N263 crystal detector followed by a direct coupled SBT amplifier was tested for recovery time following overload by a 350 millwatt peak RF pulse. A video pulse up to .35 V peak could be achieved. The recovery time was found to be less than 0.5 microseconds, and is probably less than 0.1 microsecond. This represents a major improvement over previous crystal video receivers using vacuum tubes.

A block diagram of the test set up is shown on the attached sketch. Two RF signals are generated in the X-band frequency range. One klystron provides the RF overload pulse, at least 350 mw peak, 2 microseconds wide. The other klystron generates a low level signal modulated at 1 mc. Any changes in the receiver characteristics after overload is noted by changes in the amplitude of the 1 mc signal at the output.

The maximum input signal to the SBT amplifier without overload is about 2 millivolts. The voltage gain is about 2,000, and the bandwidth is 1/2 megacycle. The pulse from the detector was positive.

Both direct coupling and condenser coupling was tried between the detector and the amplifier.

The 1N263 was mounted so that it conducts in the forward direction when biased negative. When direct coupled to the amplifier, a negative bias of 0.14 volts was applied to the detector. This is close to optimum from a noise figure standpoint.

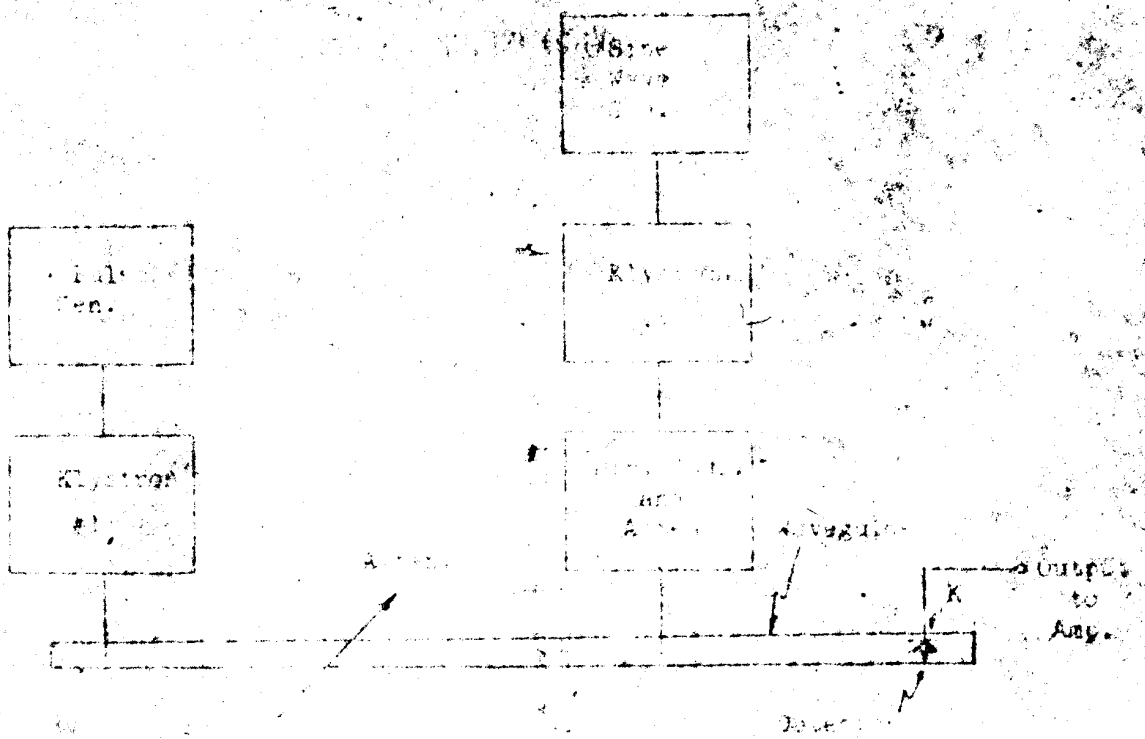
Figure 1 shows the output of Receiver #1 (with condenser coupling) with: A, no pulse input; B, some pulse overload; and C, 350 millowatt pulse overload. In Figure 1B, and C senstivity to the 1 mc. signal immediately after overload (during the decay of the pulse) is seen to be approximately the same as for overload.

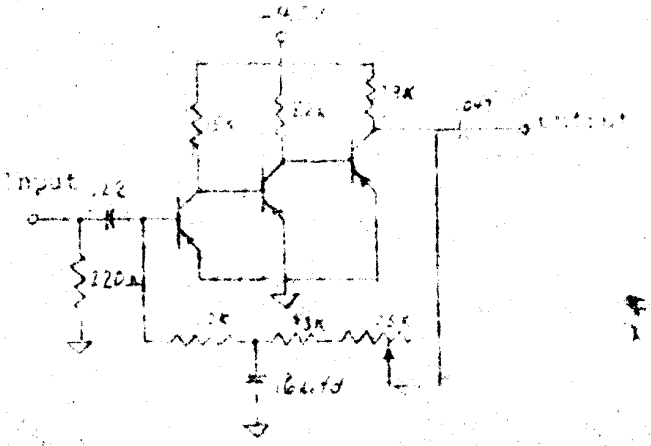
Figure 2 shows the output signal from the condenser coupled detector and amplifier between 350 mw pulses. The sloping base line comes from the overshoot from the partial differentiation of a pulse inherent in any series condenser resistor combination. With sufficiently large signal the overshoot can be great enough to overload and thereby wipe out the amplification of the small 1 mc signal. See Figure 1C. The peak to peak excursion in Figure 1C is about equal to the 4.5 V battery supply voltage. This would be expected when overload in both direction occurs.

Figure 3 shows the output from the direct coupled detector and amplifier. No pulse differentiation can exist, so the true monopolar pulse output of the 1N263 detector is preserved. The dc feedback degenerates out the dc component preventing a shift in baseline and thus achieving full senstivity between pulses.

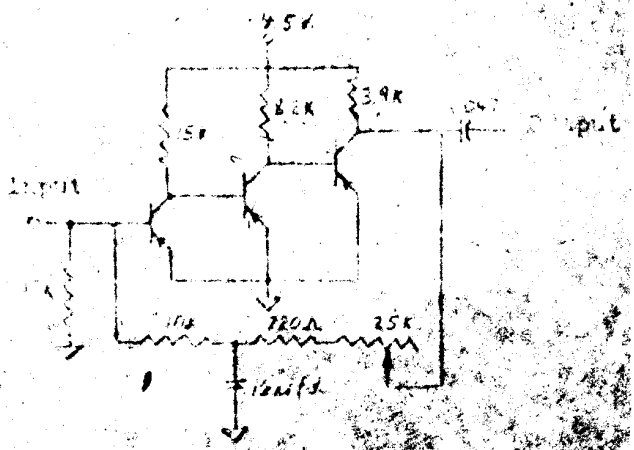
With overload in either one or both directions, it is important to again call attention to the evidences of Figures 1C 2B, and 3A showing that full sensitivity to a small signal occurs within a few tenths microsecond following overload.

BLOCK DIAGRAM OF CRYSTAL VIDEO RECEIVER AND [illegible] SET-UP





Amplifier Connection for Receiver #1



Amplifier Connection for Receiver #2

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